# HARBIN ROPV INDUSTRY DEVELOPMENT CENTER

# ROPV R80 S Series User Manual

## For Use with the Following ROPV Pressure Vessel Models:

**R80 600S  R80 1000S  R80 1200S**


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# General Product Description – R80 S Series
# Side Port Pressure Vessel

| | |
|---|---|
| R80 600S Design Pressure: | 600 PSI / 4.1Mpa / 41 Bar (at 150°F / 66°C) |
| R80 1000S Design Pressure: | 1000PSI / 6.9Mpa / 69 Bar (at 150°F / 66°C) |
| R80 1200S Design Pressure: | 1200PSI / 8.3Mpa / 83 Bar (at 150°F / 66°C) |
| Min. Operating Temp.: | 14°F / -10°C |
| Max. Operating Temp.: | 150°F / 66°C |
| Factory Test Pressure: | ASME: 1.1x Design Pressure<br>Standard: 1.5x Design Pressure |
| Burst Pressure: | 6 x Design Pressure |
| Operating pH Range: | 3 – 11 |
| Cleaning pH Range: | 2 – 12 (less than 30 minutes) |

## General Warning – High Pressure

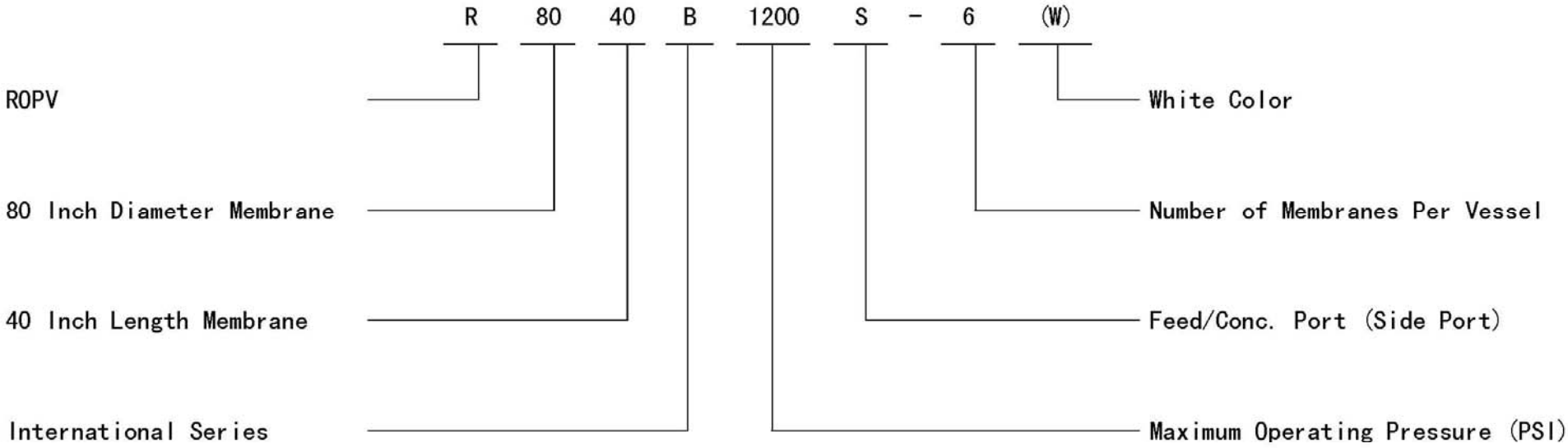
ROPV Pressure Vessels are designed to provide safe operation over a long service life if properly installed, operated, and maintained. The vessel may cause loss of life, severe bodily harm, or property damage if not correctly installed, operated, or maintained. Read and understand all guidelines provided in the vessel User Manual. Observe every precaution contained therein. Failure to do so may result in malfunction and potential catastrophic failure. It is recommended that only qualified technicians experienced in servicing hydraulic systems work with this vessel. Misuse, incorrect assembly, or use of damaged/corroded components may result in catastrophic failure.

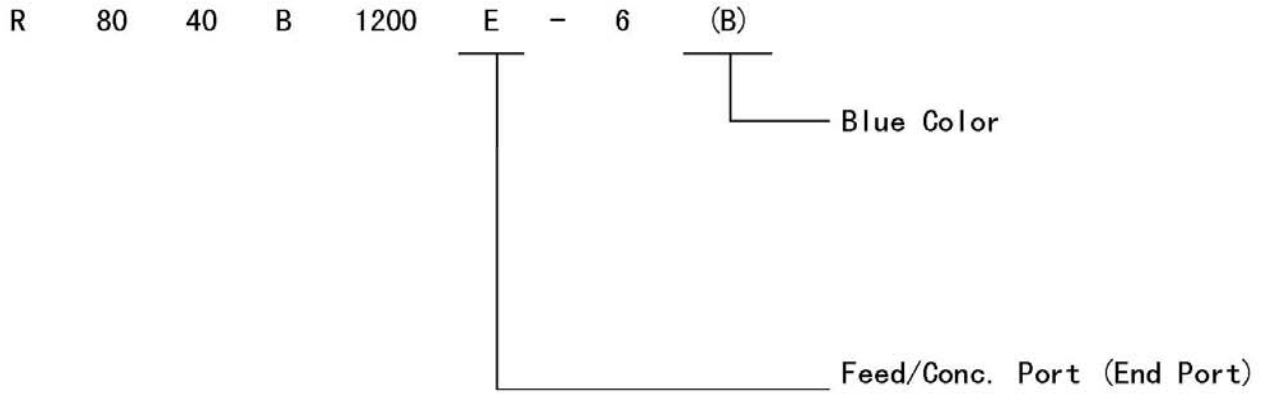
## Vessel Use and Precautions

- Positive pressure up to the design pressure (PSI) of the specific model being used.
- Accommodates standard 8” nominal diameter spiral-wound element.
- The required vessel/element interface hardware is supplied with the vessel. Ensure that an element adapter is installed at each end of the vessel before use.
- Vessel expands under pressure and careful consideration must be taken when installing straps/saddles and system connection piping.
- Installation with the straps/saddles provided is strongly recommended
- Vessel should not support any other system components. Connections should be non-load bearing.
- Periodic inspection of the vessel end closure is recommended to ensure all parts are dry and free of corrosion.
- Failure to understand and follow all precautions may void warranty and result in catastrophic failure of the vessel.
- These guidelines are subject to change. Please check with ROPV to ensure that the User Manual is the latest version for the vessel model being used.
- Mount vessel using strap/saddle hardware provided and span recommended in the engineering drawing.
- Do not over tighten the straps – vessel must be allowed to expand under operation.
- Maximize the connection flexibility to allow for vessel growth under pressure.
- Align the side ports with the system manifold, correcting any misalignment before final installation.

- Provide overpressure protection in the system safety devices.
- Inspect end closures regularly for signs of corrosion. Immediate corrective action and/or replacement is suggested in case of corrosion.
- Relieve system pressure before working on the vessel.
- Do not attempt to over-tighten the Permeate Port connections as this may damage the end closure. One turn past hand tight should be sufficient.
- Ensure that the Trust Cone is installed on the downstream end of the vessel.
- Never operate the vessel in excess of its ratings. This may void the warranty and cause bodily or property damage.
- Do not operate the vessel permeate port over 125PSI.
- Flush the vessel with permeate before system shutdown to reduce the chance of corrosion.
- Do not install the vessel in direct sunlight.
- Operate the vessel within the recommended pH range - Operating pH Range: 3 – 11, Cleaning pH Range: 2 – 12 (less than 30 minutes).

## Model Explanation



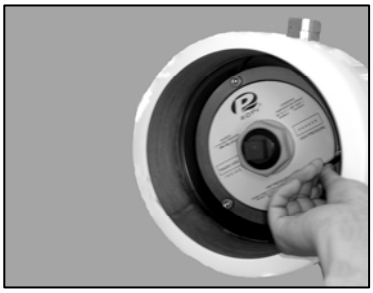
# Head Removal

**Step 1 Shut Down System and Relieve System Pressure** – The system must be shut down and all pressure relieved before conducting any maintenance or repair on the vessel.

**Step 2 Disconnect Permeate Piping** – The system permeate piping must be carefully removed from the permeate port of the vessel.

**Step 3 Inspect End Closure** – The end closure should be inspected for any signs of corrosion or damage. Surface corrosion can be removed with a wire brush, while flushing with water. Damaged components should be replaced with approved components from ROPV.

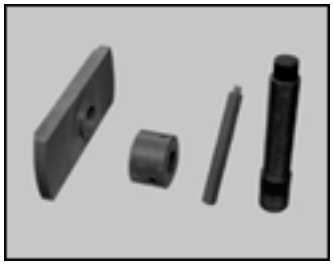
**Step 4 Disconnect Locking Screws** – Each of the three locking segments is held in place with a securing ring. The securing ring is held in place with 3 locking screws. The locking screws can be removed using an M6 / 7/32" hex wrench. The locking screws should be unthreaded from the head only, not from the locking segment. The locking screw and locking segment can be removed together.



**Step 5 Remove the Locking Segment/Screw Assemblies** – The locking segment/screw assemblies should be easily removed from the retaining groove. Should the assemblies be difficult to remove, it may be necessary to rock the head slightly or tap the head inward with a rubber mallet. Be careful when using metal tools, avoiding leveraging against the sidewall of the vessel or scratching the inside surface of the bell area.

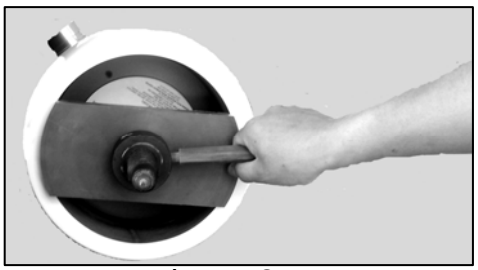
**Step 6 Remove the Head Assembly with One of the Following Techniques**

**ROPV Head Removal Tools** – A set of head removal tools is available from ROPV. While not necessary for head removal, they have proven an effective and easy way to remove the vessel head without causing any damage to the vessel.



Picture 1

Picture 2



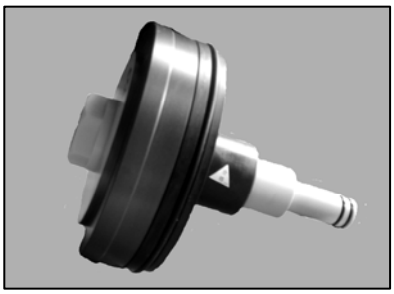
Picture 3

Picture 1 – Detail picture of head removal tools.
Picture 2 – Thread the center piece into the permeate port of the head assembly, to hand tight. Do not over tighten the center piece.

Picture 3 – Position nut, bearing rod, and bearing block as shown. Turn bearing rod clockwise. The head will move with the bearing rod as it moves toward the end of the vessel. You will be able to remove the head once it has cleared the retaining groove area of the vessel.

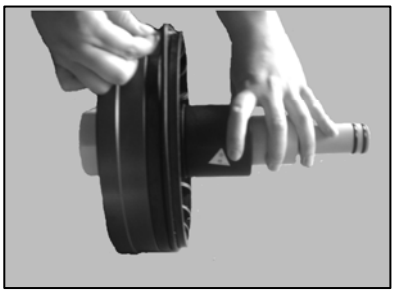
**Alternative Head Removal** – It is possible to remove the head assembly without the ROPV head removal tools. A 1" NPT Male threaded piece of PVC (or similar material) pipe should be threaded into the head permeate port to hand tightness. Pull the pipe outward to remove the head. If the vessel has been in operation for an extended time, a slight rocking motion or forceful tug may be required to break the head seal bond. Also, a handle at the end of the pipe will ease head removal – forming a T with the pipe that threads into the permeate port.

**Complete Head Assembly with Adapter**

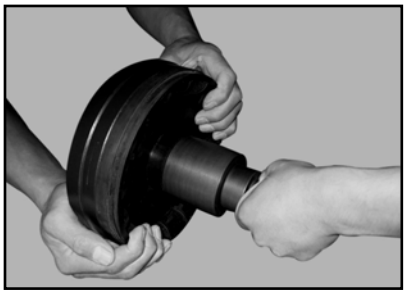


## Head Disassembly and Inspection

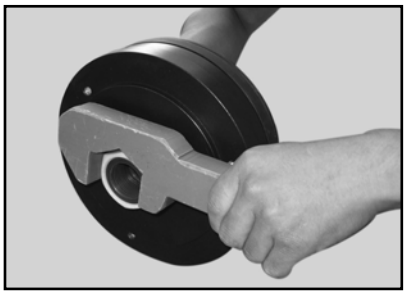
**Step 1 Remove the Head O-ring** – Use a non-metallic, rounded tool to start the o-ring out of the o-ring groove. Once a small portion of the o-ring has been lifted out of the groove, use your hand to work the remainder of the o-ring out of the groove. Damaged or cut o-rings must be replaced during re-installation of the head.



**Step 2 Remove Adapter** – Grasp the adapter slowly pull from the bearing plate/permeate port. A slight rotating motion may ease the removal of the adapter. There is a set of double o-rings on the inside diameter of the permeate port that must be inspected for damage once the adapter is removed. Damaged o-rings must be replaced before re-installation.



**Step 3 Remove Bearing Plate** – Use a wrench to remove the permeate port Locknut. The locknut is reveres threaded (or left hand threaded) and must be turned clockwise to be removed and counter clockwise to be installed. After removing the locknut, the bearing plate and sealing plate can be separated.



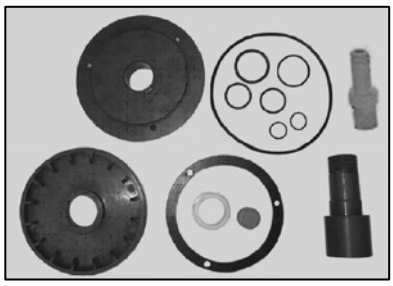
**Step 4 Remove Permeate Port** – Grasp the Permeate Port and slowly pull from the bearing plate. A slight rotating motion may ease the removal of the Permeate Port. The permeate port that must be inspected for damage once it is removed. Damaged o-rings must be replaced before re-installation.

**Step 5 Clean All Components** – All components should be cleaned with a mild soap solution or clean water. The components should be air dried or dried with a lint-free towel.

**Step 6 Inspect All Components** – All components should be carefully inspected for signs of corrosion and damage. Components exhibiting such should be replaced before re-installation. All o-rings should be carefully inspected for signs of damage. It is recommended that all o-rings be replaced during each complete servicing of the vessel. Failure to do so may cause poor system performance.

**Step 7 Inspect Inside Vessel Surface** – The inside surface of the vessel should also be inspected once the membrane elements have been removed. Special attention should be paid to identify any scratches, damage or foreign matter. Surface scratches can be repaired by carefully sanding the effected surface with 600-grit sandpaper. A combination of soapy water and fresh water should be used to flush the area during sanding. Clean water should be used to clean the area after sanding. Any extemporaneous matter can be removed with a soft cloth, soapy water, and a clean water flush. Damaged vessels should not be used under any circumstances.

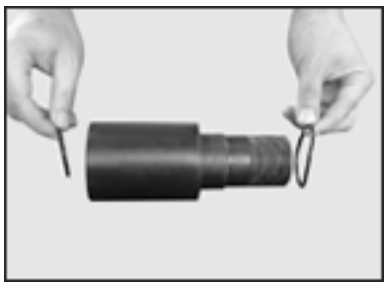
**Picture of Disassembled Head Components**



## Head Reassembly

**Step 1 Inspect All Head Components** – All head components should be free from scratches, foreign matter, or any sign of damage. Please see Step 6 above for additional information about cleaning head components. Scratched or damaged components should be replaced with ROPV supplied replacement components. All o-rings should be carefully inspected for signs of damage. It is recommended that all o-rings be replaced during each complete servicing of the vessel. Failure to do so may cause poor system performance.

**Step 2 Install Permeate Port O-rings** - All o-rings should be coated with a thin layer of glycerine before installation. Care should be used to minimize the amount or glycerine applied and any excess should be removed. Petroleum based lubricants should not be used as they may cause membrane damage. Seat one o-ring into each of the two grooves located on the inside diameter of the permeate port.

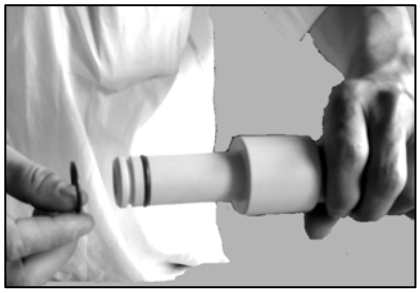


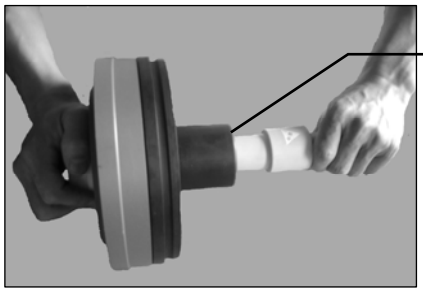
**Step 3 Assemble Sealing plate and Permeate Port**

**Step 4 Place Bearing Over Sealing Plate**

**Step 5 Thread Lock Nut Onto Permeate Port** – Lock nut should be tightened to hand-tightness using a wrench for the final half-turn. Do not over tighten the Lock Nut – maximum torque guideline: 15Nm. Note that the threads of the Permeate Port are reverse or left-hand threaded.

**Step 6 Install Adapter O-rings** – All o-rings should be coated with a thin layer of glycerine before installation. Seat one permeate port o-ring into each of the two grooves located at the element end, outside diameter of the adapter.

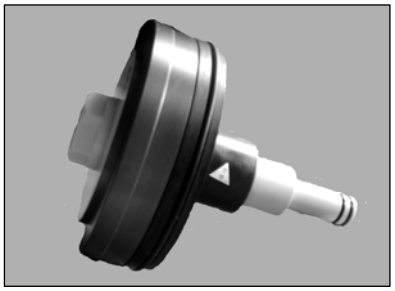





**Step 7 Install Adapter** – The adapter should be pushed into the permeate port until the wider diameter middle section is flush against the end of the permeate port. Simultaneously pushing and turning the adapter will ease installation.

**Step 8 Install Head O-ring** – All o-rings should be coated with a thin layer of glycerine before installation. Seat the head o-ring into the groove on the outside diameter of the head.

**Complete Head Assembly with Adapter**

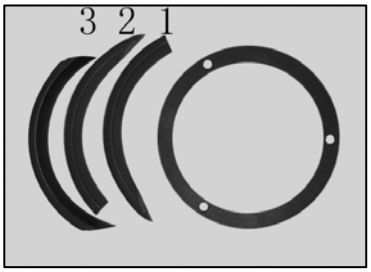


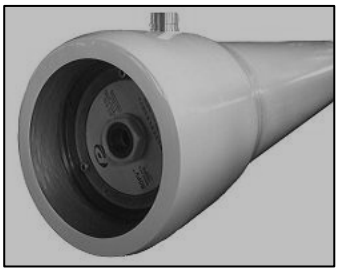
# Head Installation

**Step 1 Follow All Steps Outlined in the Head Reassembly Section**

**Step 2 Install Head** – Hold the head assembly with both hands, square to the axis of the vessel. Push firmly with both hands until the head is correctly positioned and the retaining groove is visible. It may be necessary to use a rubber mallet to tap the head into its engaged position. The thrust cone must be installed with the head at the downstream end of the vessel.

**Step 3 Install Locking Kit Segments** – Clean and dry the retaining groove. Position the first two locking segments (No.1 and No.2 in picture) so that the end section sits in the retaining groove. Position the third locking segment (No.3) into the last area. Position the securing ring as shown and use an M6 / 7/32" hex wrench to tighten the screw until snug. Do not over-tighten – maximum torque guideline: 10Nm. Install the two other segments in the same manner. Conduct a final tightness check of each screw after all three segments are installed.



**Locking Kit Segment and Securing Ring**

**Step 4 Reconnect Permeate Piping** –Reconnect the system permeate piping to the permeate port. The maximum torque of Permeate Port is 15 Nm. Tighten piping to 50% of the maximum torque figure.

**Step 5 Conduct Pre-Pressurization Inspection** – A thorough pre-pressurization inspection should be conducted, including verifying that the heads are properly installed, system piping connections are in place, elements are installed, adapters are installed, and thrust cone is installed at downstream end of the vessel.

**Step 6 Pressurize System**

**Step 7 Inspect for Leaks** – All connections should be free from leaks. Do not operate leaking vessels.

## Piping and Mounting Recommendations

**Use two flexible Victaulic™ connections with an intermediate section of pipe when possible.** This is the preferred method for connecting the feed/concentrate ports to the system piping, especially when system manifold tolerances can not be guaranteed. There is a maximum 0.03" misalignment allowance per port.

**Single flexible Victaulic™ connections should only be used when the axial misalignment from the port to the manifold is less than 0.03" per port.** Make sure the vessel is centered on the rack when checking for port/manifold alignment.

**Using intermediate flexible Victaulic™ connections in the manifold will ease port alignment and vessel installation.**

**Do not force any connections.**

**The Header and related piping should be self-supported.**

**Space strap/saddle locations using "S" dimension shown in model engineering drawing.** -4 and longer vessels have a third strap/saddle assembly, to be installed at the center point of the vessel.

**Tighten straps to hand tightness plus one turn.**

**Manifold span should be greater than vessel span to allow for vessel growth under pressure.**

# ROPV Limited Warranty

Harbin ROPV Industry Development Center (hereinafter called “ROPV”) vessels (the “Product”) are warranted to the original purchaser (the “Customer”) under normal use and if installed, operated and maintained in accordance with applicable User Guides to be free of defects in material and/or workmanship for a period of one (1) year from date of manufacture subject to the following. Any replacement Product or Part will be warranted only for the remainder of the original warranty period or thirty (30) days, whichever is longer.

**Exclusions from this Limited Warranty**

The warranty shall be void if:

1. defects are not reported during the warranty period.
2. the Product is subject to accident, damage, incorrect installation, mishandling, abuse, misuse, negligence or accident by any other party.
3. problems caused by modification or alteration.
4. chemical exposure or acts of nature.
5. any item manufactured by other companies.
6. wear on replaceable components under normal conditions – seals are excluded from this warranty.

**Procedure for Obtaining Warranty Performance**

ROPV reserves the right to determine if a reported defect is a breach of this warranty. This may require, at ROPV’s discretion, one or more of the following: 1. an inspection or test of the Product and/or the system in which it was installed by an ROPV representative - the customer is responsible for arranging access to the Product. 2. an inspection or test of the product and/or the system in which it was installed by the Customer. 3. an inspection or test of the product and/or the system in which it was installed by third party inspector appointed by ROPV. 4. return of the Product to ROPV’s factory for inspection or testing. This is not a statement of limitations for warranty performance and ROPV reserves the right to conduct warranty performance outside of the items shown.

If the Product is found by ROPV to be defective under the terms of this warranty, ROPV will perform one of the following at its option: 1. supply a substantially similar replacement part based on FOB factory terms. 2. conduct a field repair of the Product. 3. issue a credit for the original cost of the Products. This is not a statement of limitations for warranty performance and ROPV reserves the right to conduct warranty performance outside of the items shown.

Products returned to ROPV for inspection or testing must be shipped freight prepaid at the Customer’s expense. If a breach of warranty is confirmed, ROPV will bear all costs related to the inspection and testing. If the Product failure is found to be caused by cause other than breach of warranty, all costs related to the inspection and testing of the Product will be borne by the Customer. This includes a USD$500 per day fee and all related travel expenses.

All reported defects must be submitted to ROPV in writing.

**Disclaimer**

ROPV makes no expressed or implied warranty other than that specifically set forth in this warranty statement. ROPV disclaims any warranty of merchantability or of fitness for a particular purpose.

ROPV’s liability under the terms of this warranty shall not exceed the purchase price of the Product which are claimed to be defective. ROPV shall not be liable for any consequential or incidental damages whatsoever, including but not limited to injuries or damages to person or property, loss of business profits, business interruption, loss of use, cost of removing/installing Products, or the claims of third parties.

**Warranties or Representations by Others**

No agent, employee, dealer, or other person has any authority to make any warranties or representations concerning ROPV or the Product. ROPV is not responsible for such claims of warranty or representation.